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Summary of Grass Stimulator Units

[Stimulators Table of Contents](#)

Model	S88X Dual Output Analog	S88 Dual Output Analog	S48 Single Output Analog	SD9 Output Analog
Intended Use	Advanced physiological research with dual output, delay, trains. No isolation	Advanced physiological research with dual output, delay, trains. No isolation	Advanced physiological research with delay, trains. No isolation	Student Lab, most research with delay. No trains. Output isolation
Variable Parameters	Frequency, delay duration, voltage independent at both S1 and S2 outputs. Common train duration, train rate. Analog	Frequency, delay duration, voltage independent at both S1 and S2 outputs. Common train duration, train rate. Analog	Frequency, delay, duration, voltage, train duration, train rate from single output. Analog	Frequency, delay, duration and voltage. Analog
Frequency Range	0.01 to 1000 PPS	0.01 to 1000 PPS	0.01 to 1000 PPS	0.2 to 200 PPS
Pulse Delay	10 μ s to 99 sec	10 μ s to 10 sec	10 μ s to 10 sec	0.02 to 200 msec
Pulse Duration	10 μ s to 99 sec	10 μ s to 10 sec	10 μ s to 10 sec	0.02 to 200 msec
Voltage Range (No load voltage)	10 mV to 24 VDC (monophasic) ± 10 mV to ± 12 VDC (biphasic)	10 mV to 150 volts each output	10 mV to 150 volts	0.1 to 100 volts
Peak Output Current	1 A standard	450 mA standard	650 mA standard	50 mA
Output Impedance	<2 ohms	100 kohm, 250 ohm or 25 ohm each output	100 kohm, 250 ohm or 25 ohm selectable	1 kohm approx.
Maximum Power Out	24 watts peak	22 watts each output	22 watts	2.5 watts
Train Rate	1 train/100 sec to 99 TPS	1 train/100 sec to 100 TPS	1 train/100 sec to 100 TPS	Not available
Train Duration	1 msec to 99 sec	1 msec to 10 sec	1 msec to 10 sec	-----

Isolation of Stimulus Pulse from Ground	Optional Stimulus Isolation Units (SIU), 2 required	Optional Stimulus Isolation Units (SIU), 2 required	Optional Stimulus Isolation Unit required	Built-in (RF type)
Biphasic Pulse and Polarity Reversal	Yes	With optional SIUs	With optional SIU	Yes
Synchronous Input (Minimum positive voltage required)	TTL compatible, +5 volts	TTL compatible, +5 volts	TTL compatible, +5 volts	TTL compatible, +5 volts
Synchronous Outputs	With stim, prestim (delay) for S1 and S2 and train	With stim, prestim (delay) for S1 and S2 and train	With stim, prestim (delay) and train	With stim onset and prestim (delay)
Stimulus Output Combinations	Single, repetitive, twin pulses, trains of pulses, trains plus post train pulses. Plus train and arrhythmic pulse.	Single, repetitive, twin pulses, trains of pulses, trains plus post train pulses. Plus train and arrhythmic pulse.	Single, repetitive, trains of pulses, twin pulses from single output	Single, repetitive and twin pulses
Trains of Pulses	Yes (both outputs)	Yes (both outputs)	Yes	Externally controlled
AC Power Required	100 watts maximum	125 watts peak	70 watts peak	30 watts peak
Physical Size	19" W x 5.25" H x 12.5" D (48.3 cm x 13.4 cm x 31.8 cm)	17.25" W x 8.75" H x 8.5" D (43.8 cm x 22.3 cm x 21.6 cm)	17.25" W x 5.25" H x 8.5" D (43.8 cm x 13.3 cm x 21.6 cm)	9.5" W x 5.25" H x 5.5" D (24.1 cm x 13.3 cm x 13.9 cm)
Weight	10 lbs. (4.5 kg)	22 lbs. (10 kg)	17 lbs. (7.72 kg)	3.7 lbs. (1.6 kg)

[← Previous Page](#)
[↑ Back To Top](#)

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